

REMARKS

Below, the applicant's comments are preceded by related remarks of the examiner set forth in small bold type.

Claim Rejections 35 U.S.C. § 102

3. Claims 24-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Hongoh, US Patent 6,343,565 B1. Hongoh teaches a plasma processing apparatus that includes: a chamber S; a support 24 for supporting a wafer (plate)W; a high frequency source 76; and an inlet structure comprising a first gas supply 54 connected to a first inlet 38 via a first flow controller 46, and a second gas supply 56 connected to a second inlet 40 via a second flow controller 48. (Figure 5)

The particular type of gas used is a process limitation rather than an apparatus limitation, and the recitation of a particular type of gas does not so limit an apparatus claim, see *In re Casey*, 152 USPQ 235; *In re Rishoi*, 94 USPQ 71; *In re Young*, 25 USPQ 69; *In re Dulberg*, 129 USPQ 348; *Ex parte Thibault*, 164 USPQ 666; and *Ex parte Masham*, 2 USPQ2d 1647. This rejection is based on the fact that the apparatus of Hongoh has the inherent capability of supplying the desired gases intended by the Applicant. Furthermore, it has been held that: claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danley*, 120 USPQ 528, 531, (CCPQ 1959); "Apparatus claims cover what a device is, not what a device does" (Emphasis in original) *Hewlett-Packard Co. V. Bausch & Lomb Inc.*, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990); and a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). Also see MPEP 2114.

The specific type of substrate (i.e. quartz) worked on (i.e. etched) is an intended use of the apparatus. This rejection is based on the fact that the apparatus structure of Hongoh has the inherent capability of working on (i.e. processing) a quartz substrate, as intended by the Applicant. It has also been held that "Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim." *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969). Furthermore, "Inclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims." *In re Young*, 25 USPQ 69 (CCPA 1935) (as restated in *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

The only structural limitation in claims 27-31 is a chamber in which a plasma containing multiple gases is formed. Hongoh teaches such a chamber.

Claims 29-31 deal directly with how the apparatus is used. The limitations are specifically connected to the type of gases supplied and the specific mixture of these gases. The Examiner can find no structure taught by the applicant that directs or controls the gases to achieve these process limitations (i.e. showerhead, baffle) other than the generic gas inlet system. In fact, the only way to achieve these process limitations taught by the Applicant is to control the mixture or ratio of the gases delivered to a known apparatus.

...

4. Claims 24-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Hanawa et al, US Patent 6,634,313 B2. Hanawa et al. teaches a plasma etching apparatus that includes: a chamber 12; a support 74 for supporting a substrate (plate) 32; a high frequency source 124; and an inlet structure comprising a first gas supply 92 connected to a first inlet 71 via a first flow controller 42, and a second gas supply 94 connected to a second inlet 70 via a second flow controller 42. (Figure 1)

...

5. Claims 24-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Collins, US Patent 6,736,931 B2. Collins et al teaches a plasma etching apparatus that includes: a chamber 40; a support 54 for supporting a wafer (plate) 56; a high frequency source 68; and an inlet structure comprising a first gas supply connected to a first inlet 64a via a first flow controller, and a second gas supply connected to a second inlet 64b-64d via a second flow controller.

...

6. Claims 24-31 are rejected under 35 U.S.C. 102(A) as being clearly anticipated by Applicants disclosed prior art.

After describing the apparatus found in Figure 1 the applicant further discloses that "A suitable plasma chamber apparatus is available as model VRL-ME-II-M-QTZ from Unaxis, St. Petersburg, Florida." (See the specification page 14 lines 13-15)

Response to Arguments

7. Applicant's arguments filed October 18, 2004 have been fully considered but they are not persuasive.

In regard to the argument that "The limitation "a substrate comprising a quartz plate" recites structure, and is not an "expression relating the apparatus to contents thereof".", the Examiner disagrees. As discussed above, the quartz plate is a substrate that is processed (i.e. etched) by the apparatus. It is not a structural element, and does not enable the apparatus to function. The apparatus would function the same if the substrate were replaced with another type of substrate such as a silicon wafer. The structural elements include the chamber, a support supporting the quartz plate, a high frequency power source, the gas supplies, and inlet structure. If any of these elements were removed the apparatus would not function. Please note that if the quartz plate (substrate) is removed, the Apparatus will still function by forming a plasma using etching gases, which is commonly done to clean the chamber.

In regard to the argument directed to In re Young, the Examiner disagrees. In re Young was properly applied. The limitation of a substrate was considered. All of the rejections include a substrate being processes. The specific material of substrate processed was considered, and it was determined that the apparatus of Hongoh, Hanawa et al, and Collins et al were all inherently capable of processing a quartz substrate. The processing of a quartz substrate using SF6 and CF4 (etc) is well known in the art as suggested by Oda et al in "X-ray mask fabrication technology for 0.1 μ m very large scale integrated circuits" (See SiO₂ etching).

The applicant thanks the examiner for the telephone interview of April 15, 2005. The

pending claims and the remarks in the previous office action were discussed.

Claim 24

Without conceding the examiner's position, claim 24 has been amended.

Neither Hongoh, Hanawa, Collins, nor applicant's disclosed prior art discloses or suggests "[a] quartz plate etching apparatus, comprising: a chamber having a first plasma ... and a second plasma ...; a quartz plate supported within the chamber," as recited in amended claim 24. Hongoh discloses "a plasma processing apparatus which processes a wafer for producing a semiconductor device ..." (col. 1, lines 9-10). Hanawa discloses a process chamber 12 including "a substrate support member ... [that] is configured to support wafers ..." (col. 4, lines 15-18). Collins discloses an RF plasma reactor having a pedestal that "supports [a] workpiece 18, such as a semiconductor wafer ..." (col. 1, lines 45-46). The applicant's disclosed prior art mentions a plasma etching chamber.

The applicant disagrees with the examiner's position that claim 24 is anticipated by a prior art reference that discloses an apparatus having the inherent capability of processing a quartz substrate. During the telephone interview, the examiner stated that he had considered the "quartz plate" limitation, but did not give such limitation patentable weight because the quartz plate is a substrate that is processed by the apparatus, and is not a structural element.

The examiner's rejection is improper because "[a] claim is anticipated only if each and every element as set forth in the claims is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987). See also MPEP section 2131 on anticipation. Because claim 24 positively recites "a quartz plate," claim 24 would be anticipated by a reference only if the reference expressly or inherently discloses a quartz plate. Neither Hongoh, Hanawa, Collins, nor applicant's disclosed prior art expressly or inherently discloses a quartz plate. Just because a reference discloses an apparatus that is "capable" of processing a quartz plate does not mean that the reference inherently discloses processing the quartz plate.

The examiner cites Ex parte Thibault and In re Young to support his position. However, Ex parte Thibault can be distinguished because the claim language considered in Ex parte

Thibault is very different from that of claim 24 in the present application. In Ex parte Thibault, the court stated that the limitation "a reservoir *** molten condition" reads on either a heated or an insulated tank, which is met by the heated feed tank disclosed in Walker. By contrast, claim 24 of the present application positively recites "a quartz plate," which is a structural limitation and is not an expression "relating the apparatus to contents thereof during an intended operation," as was the case in Ex parte Thibault.

The examiner's position is also not supported by In re Young, in which the court held that if a claim (including all limitations) is considered to involve no invention in view of the prior art, then just because one of the claim elements includes a material being worked upon, does not by itself make the claim patentable. Because none of the prior art references disclose or suggests a "quartz plate etching apparatus," and "a quartz plate supported within the chamber," claim 24 as a whole is not anticipated by any of the references.

The examiner stated that the processing of a quartz substrate using SF₆ and CF₄ is known in the art as suggested by Oda. If the examiner contends that claim 24 would have been made obvious by Oda, the applicant requests that the examiner formally make such a rejection under 35 U.S.C. 103. Note that in Oda, the silicon oxide thin film is deposited on SiN and Ta layers. When using SF₆ and CF₄ to etch the silicon oxide thin film, the Ta layer will stop the etching after the silicon oxide is etched away. When etching a quartz plate, there is no such stop layer. If SF₆ and CF₄ were used to etch the quartz plate, without the benefit of this invention, the central portion of the quartz plate will be etched at a rate different from the peripheral portion of the quartz plate.

Claim 27

Neither Hongoh, Hanawa, Collins, nor applicant's disclosed prior art discloses or suggests "a first plasma ... having more negative ions than electrons; and a second plasma ... having more electrons than negative ions, the amounts of the first and second plasmas having a specified ratio so that a combination of the first and second plasmas etch a substrate in the chamber in which the rate of etching at a peripheral portion of the substrate is within 1% of the

rate of etching at a central portion of the substrate," as recited in claim 27.

The applicant disagrees with the examiner's position that "[t]he particular type of gas used is a process limitation rather than an apparatus limitation, and the recitation of a particular type of gas does not so limit an apparatus claim ... This rejection is based on the fact that the apparatus of Hongoh has the inherent capability of supplying the desired gases intended by the Applicant." As discussed above, "[a] claim is anticipated only if each and every element as set forth in the claims is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v. Union Oil Co. of California. Because claim 27 positively recites "a first plasma ... having more negative ions than electrons," "a second plasma ... having more electrons than negative ions," and the relationship between the first and second plasmas, claim 27 would be anticipated by a reference only if the reference expressly or inherently discloses such first and second plasmas. Just because a reference discloses an apparatus that has the "inherent capability" of supplying gases to produce the first and second plasmas does not mean that the reference inherently discloses the first and second plasmas as recited in claim 27.

For example, the first diving tank that included a mixture of nitrogen, oxygen, and inert gases having specific ratios for preventing decompression illness is novel and unobvious as compared to a prior art diving tank that did not have the specific ratio of gases and could not prevent decompression illness. While the tank structure itself is not new, the combination of the tank and the gases having the specific ratios is novel and unobvious. Just because a reference discloses a prior art diving tank that has the inherent capability of containing a particular mixture of gases to prevent decompression illness does not mean that the reference inherently discloses a diving tank that actually contains the particular mixture of gases and can be used to prevent decompression illness.

Similarly, in the present application, although the chamber structure itself is not new, the combination of the chamber and the particular types of first and second plasmas is novel and unobvious in view of the prior art.

The examiner cited In re Casey, 152 USPQ 235, In re Rishoi, 94 USPQ 71, In re Young, 25 USPQ 69, In re Dulberg, 129 USPQ 348, Ex parte Thibault, 164 USPQ 666, and Ex parte

Masham, 2 USPQ 2d 1647. The applicant has reviewed each of these cases and found that they do not support the examiner's position that "the particular type of gas used is a process limitation rather than an apparatus limitation, and the recitation of a particular type of gas does not so limit an apparatus claim." The cases are discussed in turn below.

In In re Casey, the claim under appeal (claim 1) was rejected by the court because it did not positively recite a limitation that is required to overcome a prior art patent. Specifically, claim 1 recites "said brush being formed with projecting bristles which terminate in free ends to collectively define a surface to which adhesive tape will detachably adhere." (emphasis added) A difference between the machine of claim 1 and a prior art machine is that the machine of claim 1 is a tape dispenser while the prior art machine is a perforating device. The court stated that, "[w]hile claim 1 continues to note that adhesive tape will adhere to a brush, the structure so indicated differs in no way from that present in Kienzle where a driven brush is shown as supporting a band of material. The structure thus provided has the capabilities recited which is all that is required to satisfy the terms of the claims" (152 USPQ 235, 237). In claim 1, the brush defines a surface "to which adhesive tape will detachably adhere." Claim 1 is anticipated by the prior art machine because, if the prior art machine is used with an adhesive tape, the prior art machine would also define a surface to which adhesive tape will detachably adhere.

Different from claim 1 of In re Casey, claim 27 of the present application positively recites "a first plasma ... having more negative ions than electrons" and "a second plasma ... having more electrons than negative ions." Claim 27 does not recite a chamber that will receive the first and second plasmas, rather, claim 27 recites a chamber that actually includes the first and second plasmas.

In In re Rishoi, one claim under appeal (claim 3) recites "[a] device for handling fatty material, ... comprising a metal base having a roughened surface provided with a covering layer of small metal particles for contacting said material ... whereby a film of liquid substantially insoluble in said fatty material may be maintained on said covering layer, to prevent said fats from adhering to said layer." Another claim under appeal (claim 10) recites "[a] device for use as a churn and butterworker comprising a sheet metal drum provided with a roughened inner

surface ... and a film of liquid covering exposed portions of said roughened inner surface ...” A prior art patent disclosed a churn designed to handle fat-containing products when mixed with a liquid such as water.

In In re Rishoi, the prior art churn is used in a way so that contents in the churn are shaken about in touch with the walls and will not adhere to the walls. The prior art patent disclosed a metal surface similar to the metal surface sought to be claimed, and also disclosed the use of a film of liquid on the metal. Both a sheet metal drum and a film of liquid are disclosed in the prior art patent, so the liquid-film cannot impart patentability to the claim which is otherwise unpatentable, and there is no patentable combination between the sheet metal drum and the film of liquid since the combination is already disclosed in the prior art patent.

In In re Young, the court held that if a claim (including all limitations) is considered to involve no invention in view of the prior art, then just because one of the claim elements includes a material being worked upon, does not by itself make the claim patentable. The court did not hold that if an apparatus claim includes a limitation that includes a material that is used during the operation of an apparatus, that limitation is a process limitation and does not limit the apparatus claim. Neither did the court discuss whether a limitation reciting particular types of gases would limit an apparatus claim.

In In re Dulberg, the court discussed whether a prior art structure fully meets the terms of the appealed claims if a cap which is said to be press fitted is removable. The applicant contends that this case is not relevant to the issue of whether a limitation reciting particular types of gases would limit an apparatus claim.

In In re Thibault, the court stated that the limitation “a reservoir *** molten condition” reads on either a heated or an insulated tank. Claim 27 does not recite a chamber and its operating conditions, but rather, positively recites first and second plasmas.

In Ex parte Masham, the appealed claim 1 recites “means defining a chamber, for receiving the flowing developer material therein; and means for mixing the following developer material, said mixing means being stationary and completely submerged in the developer material.” The court stated that “[t]he preambular recitation ‘for mixing flowing developer

material ...' and the additional recitation 'completely submerged in the developer material' relate to the identity of the material worked upon by the claimed apparatus and the intended manner of employing the claimed apparatus." The court held that "a recitation with respect to the material intended to be worked upon by a claimed apparatus does not impose any structural limitations upon the claimed apparatus which differentiates it from a prior art apparatus satisfying the structural limitations of that claimed."

Claim 27 of the present application is very different claim 1 discussed in Ex parte Masham. Claim 27 positively recites first and second plasmas having particular ratios to achieve a particular result. The first and second plasmas are not limitations that "relate to the identity of the material worked upon by the claimed apparatus and the intended manner of employing the claimed apparatus."

In In re Danly, one of the claims under appeal (claim 1) recites "the construction being such that alternating electric current may be passed through the tie rod to heat the same." (emphasis added) The court held that the quoted expression is not a structural limitation because an alternating current may be passed through any tie rod that is insulated from a press frame. The court affirmed the rejection of claim 1 because a prior art patent shows insulating tie rods from a frame, and the construction shown in the prior art patent is such that an alternating current could also be pass through the tie rods.

The examiner quoted Hewlett-Packard Co. v. Bausch & Lomb Inc. out of context. In the original opinion, the court held that "there is no requirement, as B&L implies, that HP show 'operational differences' of the claimed device over the prior art. Claim 1 of LaBarre is an apparatus claim, and apparatus claims cover what a device is, not what a device does. An invention need not operate differently than the prior art to be patentable, but need only be different." What the court is referring to is that Bausch & Lomb's argument (the use of a random pattern, size and height of rough spots on the wheel does not provide any "operational difference" over a knurled wheel) is without merit. The court stated that it is sufficient for claim 1 of LaBarre to be valid over the prior art when the structure recited in claim 1 is different, and that there is no requirement that the device of claim 1 operate differently from the prior art. The

court's opinion is not relevant to the issue of whether a particular type of gas would limit an apparatus claim.

Because Hongoh, Hanawa, Collins, and applicant's disclosed prior art do not disclose or suggest the limitations of claim 27, and the cases cited by the examiner do not support his position that an apparatus claim is not limited by the particular types of gases recited in the claim, claim 27 is patentable.

The dependent claims are patentable for at least the same reasons as the claims on which they depend.

New claims 42 and 43 have been added. Examples of the controller in claim 42 and the control mechanism in claim 43 include mass flow controllers. See page 3, lines 23-27 of the specification. It is also inherent that the plasma etching system 100 of FIG. 1A may include additional control devices for controlling the flow of the etchant gases. While the prior art references cited by the examiner may disclose controllers, the references do not disclose or suggest a controller configured in the way recited in claim 42 or a control mechanism set in the way recited in claim 43. A controller configured in a particular way or a control mechanism set in a particular way is a structural limitation.

Cancelled claims have been cancelled without prejudice. The applicant reserves the right to pursue those claims in a continuing application.

Any circumstance in which the applicant has addressed certain comments of the examiner does not mean that the applicant concedes other comments of the examiner. Any circumstance in which the applicant has made arguments for the patentability of some claims does not mean that there are not other good reasons for patentability of those claims and other claims. Any circumstance in which the applicant has amended a claim does not mean that the applicant concedes any of the examiner's positions with respect to that claim or other claims.

Applicant : Y. Long He et al.
Serial No. : 10/718,832
Filed : November 21, 2003
Page : 15 of 15

Attorney Docket: 10559-583002 / P12764D

Enclosed is a \$120.00 check for the Petition for Extension of Time fee. Please apply any other charges or credits to deposit account 06-1050, referencing attorney docket 10559-583002.

Respectfully submitted,

Date: _____

5/16/2005

Rex Huang

Rex I. Huang* for
David L. Feigenbaum, Reg. No. 30,378

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110-2804
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

** See attached document certifying that Rex Huang has limited recognition to practice before the U.S. Patent and Trademark Office under 37 CFR § 10.9(b).*

21035988.doc